

Algebra ICD
Final Exam Review

key

Name:

I. Solve the equation or inequality. Check your answers. Look for extraneous solutions.

1. $5x + 6 = 31$

$$\begin{array}{r} -6 \quad -6 \\ 5x = 25 \\ \boxed{x = 5} \end{array}$$

4. $x + \frac{1}{3}x = 8$

$$\left(\frac{3}{4}\right) \frac{4}{3}x = 8 \left(\frac{3}{4}\right) \left(\frac{3}{4}\right)$$

$$\boxed{x = 6}$$

12. $7. \left(\frac{2}{3} + \frac{1}{4}t = \frac{1}{3}\right)$

$$\begin{array}{r} 8 + 3t = 4 \\ -8 \quad -8 \\ 3t = -4 \\ \boxed{t = -\frac{4}{3}} \end{array}$$

10. $2(3 + 4m) - 9 = 45$

$$\begin{array}{r} 6 + 8m - 9 = 45 \\ 8m - 3 = 45 \\ \boxed{m = 6} \end{array}$$

13. $\sqrt{x} + 3 = 5$

$$\begin{array}{r} \sqrt{x} = 2 \\ \boxed{x = 4} \end{array}$$

16. $6 - 2\sqrt{3n} = 0$

$$\begin{array}{r} -2\sqrt{3n} = -6 \\ \sqrt{3n} = 3 \\ 3n = 9 \\ \boxed{n = 3} \end{array}$$

19. $|k - 10| = 3$

$$\begin{array}{r} k - 10 = -3 \quad k - 10 = +3 \\ \boxed{k = 7} \quad \boxed{k = 13} \end{array}$$

22. $3|x + 5| = -6$

$$|x + 5| = -2$$

no solution

25. $x + 6 \leq 2$

$$\boxed{x \leq -4}$$

2. $4x - 6 = 34$

$$\begin{array}{r} +6 \quad +6 \\ 4x = 40 \\ \boxed{x = 10} \end{array}$$

5. $5y - 2 = 28 - y$

$$\begin{array}{r} +y \quad +y \\ 6y - 2 = 28 \\ 6y = 30 \\ \boxed{y = 5} \end{array}$$

16. $4. \left(\frac{7}{8}x - \frac{1}{4} + \frac{3}{4}x = \frac{1}{16} + x\right)$

$$\begin{array}{r} 14x - 4 + 12x = 1 + 16x \\ 26x - 4 = 1 + 16x \\ 10x = 5 \\ \boxed{x = \frac{1}{2}} \end{array}$$

11. $6 - 2(3x - 1) = 2$

$$\begin{array}{r} 6 - 6x + 2 = 2 \\ 8 - 6x = 2 \\ \boxed{x = 1} \end{array}$$

14. $\sqrt{2x + 1} = 13$

$$\begin{array}{r} 2x + 1 = 169 \\ 2x = 168 \\ \boxed{x = 84} \end{array}$$

17. $\sqrt{x} + 9 = 2$

$$\sqrt{x} = -7 \quad \text{no solution}$$

20. $|m| + 2 = 10$

$$\begin{array}{r} |m| = 8 \\ \boxed{m = -8} \quad \boxed{m = +8} \end{array}$$

23. $2 - |2x + 5| = -15$

$$\begin{array}{r} -|2x + 5| = -17 \\ |2x + 5| = 17 \\ 2x + 5 = -17 \quad 2x + 5 = +17 \\ 2x = -22 \quad 2x = 12 \end{array}$$

26. $14x + 9 > 13x + 4$

$$\boxed{x > -5}$$

3. $-4y - 8y = 48$

$$\begin{array}{r} -12y = 48 \\ \boxed{y = -4} \end{array}$$

6. $5 - 2x = 3x - 7x + 25$

$$\begin{array}{r} 5 - 2x = -4x + 25 \\ -5 + 4x \quad +4x \quad -5 \\ 2x = 20 \\ \boxed{x = 10} \end{array}$$

9. $3(2y - 3) = 27$

$$\begin{array}{r} 2y - 3 = 9 \\ 2y = 12 \\ \boxed{y = 6} \end{array}$$

12. $6b = (3b + 8) + 16$

$$\begin{array}{r} 6b = 3b + 24 \\ 3b = 24 \\ \boxed{b = 8} \end{array}$$

15. $3 + \sqrt{x - 1} = 5$

$$\begin{array}{r} \sqrt{x - 1} = 2 \\ x - 1 = 4 \\ \boxed{x = 5} \end{array}$$

18. $\sqrt{2y + 6} = \sqrt{2y - 5}$

$$2y + 6 = 2y - 5 \quad \text{no solution}$$

21. $-2|x + 3| = -10$

$$\begin{array}{r} |x + 3| = 5 \\ x + 3 = -5 \quad x + 3 = +5 \\ \boxed{x = -8} \quad \boxed{x = 2} \end{array}$$

24. $4|3x| - 5 = -1$

$$\begin{array}{r} 4|3x| = 4 \\ |3x| = 1 \\ 3x = -1 \quad 3x = +1 \\ \boxed{x = -\frac{1}{3}} \quad \boxed{x = +\frac{1}{3}} \end{array}$$

27. $-12x \leq 60$

$$\boxed{x \geq -5}$$

$$28. -5x \geq \frac{1}{4}$$

$$x \leq -\frac{1}{20}$$

$$31. \frac{3}{2} \cdot \frac{2}{3} (2x-1) \geq 10 \left(\frac{3}{2} \right)$$

$$2x-1 \geq 15$$

$$2x \geq 16$$

$$x \geq 8$$

$$34. 8+2x < 6 \text{ or } 3x-2 > 13$$

$$2x < -2$$

$$x < -1$$

$$3x > 15$$

$$x > 5$$

$$36. |x+1| \geq 2$$

$$x+1 \leq -2 \text{ OR } 2 \leq x+1$$

$$x \leq -3 \text{ OR } x \geq 1$$

$$39. -3|1+2x| \geq -27$$

$$|1+2x| \leq 9$$

$$-9 \leq 1+2x$$

$$-5 \leq x$$

$$\text{AND } 1+2x \leq 9$$

$$x \leq 4$$

$$-5 \leq x \leq 4$$

$$42. E = mc^2 \quad c^2$$

$$\frac{E}{m} = c^2$$

$$45. Ax + By = C \quad y$$

$$y = -\frac{A}{B}x + \frac{C}{B}$$

$$y = x+2$$

$$48. y = \frac{1}{2}x+4 \quad \text{graphing}$$

$$(4, 6)$$

$$50. 5y+x=6 \quad \text{substitution}$$

$$x = y+3$$

$$5y+y+3=6$$

$$6y+3=6$$

$$6y=3$$

$$y = \frac{1}{2}$$

$$x = \frac{1}{2} + 3$$

$$x = \frac{7}{2}$$

$$\left(\frac{7}{2}, \frac{1}{2} \right)$$

$$29. 5-9x \geq 19+5x$$

$$-14 \geq 14x$$

$$14x \leq -14$$

$$x \leq -1$$

$$32. -9 < 6x+3 \leq 39$$

$$-9 < 6x+3 \text{ AND } 6x+3 \leq 39$$

$$-12 \leq 6x$$

$$-2 \leq x$$

$$6x \leq 36$$

$$x \leq 6$$

$$-2 \leq x \leq 6$$

$$35. 3x+1 < 4 \text{ or } 2x-5 > 7$$

$$3x < 3$$

$$x < 1$$

$$30. \frac{2}{3}x+6 > 4$$

$$\left(\frac{2}{3} \right) \frac{2}{3}x > -2 \left(\frac{3}{2} \right)$$

$$x > -3$$

$$33. 17 < 5-3x < 29$$

$$17 < 5-3x \text{ AND } 5-3x < 29$$

$$12 < -3x$$

$$-4 > x$$

$$5-3x < 29$$

$$-3x < 24$$

$$x > -8$$

$$-8 < x < -4$$

$$37. |5-x| > 18$$

$$5-x < -18 \text{ OR } 18 < 5-x$$

$$-x < -23$$

$$13 < -x$$

$$x > 23 \text{ OR } x < -13$$

$$40. |10-4x|+5 < 7$$

$$|10-4x| < 2$$

$$-2 < 10-4x \text{ AND } 10-4x < 2$$

$$x < 3$$

$$x > 2$$

$$2 < x < 3$$

$$43. Q = \frac{c+d}{2} \quad d$$

$$2Q = c+d$$

$$2Q - c = d$$

$$46. A = \frac{1}{2}ah - \frac{1}{2}bh \quad h$$

$$A = \frac{1}{2}h(a-b)$$

$$\frac{2A}{a-b} = h$$

$$38. 2|2x+3| \geq 8$$

$$|2x+3| \geq 4$$

$$2x+3 \leq -4 \text{ OR } 4 \leq 2x+3$$

$$x \leq -\frac{7}{2}$$

$$\text{OR } x \geq \frac{1}{2}$$

$$41. \left| x - \frac{1}{2} \right| \leq \frac{3}{2}$$

$$-\frac{3}{2} \leq x - \frac{1}{2} \text{ AND } x - \frac{1}{2} \leq \frac{3}{2}$$

$$-1 \leq x$$

$$\text{AND } x \leq 2$$

$$-1 \leq x \leq 2$$

$$44. v = \frac{3k}{t} \quad t$$

$$t = \frac{3k}{v}$$

$$47. P = \frac{ab}{c} \quad c$$

$$c = \frac{ab}{P}$$

$$49. y+2x=6$$

$$y=-x+2$$

graphing

$$(-4, -2)$$

$$51. 2x+5y=4$$

$$x+5y=7$$

$$x = -5y+7$$

$$2(-5y+7)+5y=4$$

$$-10y+14+5y=4$$

$$-5y+14=4$$

$$-5y=-10$$

$$y=2$$

$$x = -5(2)+7$$

$$x = -3$$

$$(-3, 2)$$

$$(-3, 14)$$

52. $4x + y = 2$
 $x - y = -17$ elimination

$$\begin{array}{r} 4x + y = 2 \\ x - y = -17 \\ \hline 5x = -15 \\ x = -3 \end{array}$$

$$\begin{array}{r} -3 - y = -17 \\ -y = -14 \\ y = 14 \end{array}$$

II. Miscellaneous

53. $3x + 2y = 8$
 $-3(x + 4y = -4)$ elimination

$$\begin{array}{r} 3x + 2y = 8 \\ -3x - 12y = 12 \\ \hline -10y = 20 \\ y = -2 \end{array}$$

$$\begin{array}{r} x + 4(-2) = -4 \\ x - 8 = -4 \\ x = 4 \end{array}$$

$$\boxed{(4, -2)}$$

54. write an inequality for the graph shown:



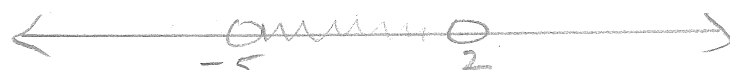
$$\boxed{x \leq -4}$$

55. write an inequality for the graph shown:



$$\boxed{x \leq -2 \text{ OR } x \geq 3}$$

57. write an absolute value inequality for the graph shown:



$$\boxed{-5 < x < 2}$$

58. A 72-inch board is cut into two pieces. One piece is twice as long as the other. How long are the pieces?

Let $x = 1^{\text{st}} \text{ piece}$
 $2x = 2^{\text{nd}}$

$$\begin{array}{r} x + 2x = 72 \\ 3x = 72 \\ x = 24 \end{array}$$

One piece is 24 inches
 & the other is 48 inches

59. The state of Colorado is the shape of a rectangle whose perimeter is 1300 miles. The length is 110 miles more than the width. Find the dimensions.

Let $w = \text{width}$
 $l = \text{length}$

$$l = w + 110$$

$$P = 2(w + 110) + 2w$$

$$1300 = 4w + 220$$

$$1080 = 4w$$

$$270 = w$$

The width is 270 mi and the length is 380 miles

60. Acme Rent-A-Car rents an intermediate-size car at a daily rate of \$44.95 plus \$0.29 per mile. A salesperson can spend no more than \$100 per day on car rental. What is the maximum number of miles the salesperson can drive?

Let $m = \# \text{ miles}$

$$\begin{array}{r} 44.95 + 0.29m \leq 100 \\ m \leq 189.8 \end{array}$$

maximum of 189 miles/day

61. The sum of two numbers is 27. One number is three more than the other number. Find the two numbers by setting up and solving a system of equations.

Let $x = 1^{\text{st}} \#$
 $y = 2^{\text{nd}} \#$

$$\begin{array}{r} x + y = 27 \\ y = x + 3 \end{array}$$

$$\begin{array}{r} 2x + 3 = 27 \\ 2x = 24 \\ x = 12 \end{array}$$

$$\begin{array}{r} 1^{\text{st}} \# = 12 \\ 2^{\text{nd}} \# = 15 \end{array}$$

62. A collection of quarters and nickels is worth \$1.25. There are 13 coins in all. How many of each are there? Set up and solve a system to answer the question.

Let $x = \# \text{ qts}$
 $y = \# \text{ nickels}$

$$\begin{array}{r} x + y = 13 \\ .25x + .05y = 1.25 \end{array}$$

$$\boxed{\begin{array}{r} 3 \text{ quarters} \\ 10 \text{ nickels} \end{array}}$$

63. There were 429 people at a play. Admission was \$1 for each adult and \$0.75 for each child. The receipts were \$372.50. Set up and solve a system to find how many children and how many adults attended.

Let $x = \# \text{ adults}$
 $y = \# \text{ children}$

$$\begin{aligned} x + y &= 429 \\ x + 0.75y &= 372.50 \end{aligned}$$

III. Exponents: Use only positive exponents to simplify.

64. $\frac{5x^3}{15x^6}$

$$\frac{1}{3x^3}$$

65. $\frac{25x^3y^4}{15xy^2}$

$$\frac{5x^2y^2}{3}$$

66. $\frac{11a^3b^{-5}c^7}{121a^5b^{-10}c^8}$

$$\frac{b^5}{11a^2c}$$

67. 8^{-2}

$$= \frac{1}{64}$$

68. -5^{-2}

$$= -\frac{1}{25}$$

69. -3^4

$$= -81$$

70. $\left(\frac{3}{2}\right)^{-3}$

$$= \frac{8}{27}$$

IV. Polynomials and Factoring: Perform the indicated operation (#71-80) or factor (#81-)

71. $(3x+6)+(2x-4)$

$$5x+2$$

72. $(3x^2+6x-4)-(-2x^2-7x-5)$

$$3x^2+6x-4+2x^2+7x+5$$

$$5x^2+13x+1$$

73. $(x^4+3x^3-x+7)+(2x^5-3x^4+x-5)$

$$2x^5-2x^4+3x^3+2$$

74. $(x^3+3x^2-4)-(-2x^2+x+3)$

$$x^3+5x^2-x-7$$

75. $3(4x-7)$

$$12x-21$$

76. $(3x+1)^2$

$$9x^2+6x+1$$

77. $\left(x+\frac{1}{2}\right)\left(x-\frac{1}{2}\right)$

$$x^2-\frac{1}{4}$$

78. $(2y+5)(2y-5)$

$$4y^2-25$$

79. $(2x-9)(3x+4)$

$$6x^2-19x-36$$

80. $(3p+q)(5p-2q)$

$$15p^2-pq-2q^2$$

81. x^2-3x

$$x(x-3)$$

82. $9x^2-4$

$$(3x+2)(3x-2)$$

83. $x^2+4x-12$

$$(x+6)(x-2)$$

Factor

84. $x^3 + x^2 + 3x + 3$

$$\frac{x^2(x+1) + 3(x+1)}{(x+1)(x^2+3)}$$

85. $2x^2 - 50$

$$2(x+5)(x-5)$$

86. $x^4 - 81$

$$(x^2+9)(x+3)(x-3)$$

87. $6x^2 - 28x - 48$

$$\frac{2(3x^2 - 14x - 24)}{2(3x+4)(x-6)}$$

88. $2x^2 - 7x - 4$

$$(2x+1)(x-4)$$

89. $25x^2 - 20x + 4$

$$(5x-2)(5x-2)$$

V. Functions: Evaluate the function or answer the question.

$f(x) = -x + 5$

$g(x) = x^2 + 2x - 6$

$h(x) = \sqrt{x+5}$

90. $f(-3)$

$$f(-3) = -(-3) + 5 = 8$$

91. $h(-4)$

$$h(-4) = \sqrt{-4+5} = 1$$

92. $g(-2)$

$$g(-2) = (-2)^2 + 2(-2) - 6 = -6$$

93. $f\left(-\frac{1}{2}\right)$

$$f\left(-\frac{1}{2}\right) = -\left(-\frac{1}{2}\right) + 5 = \frac{11}{2}$$

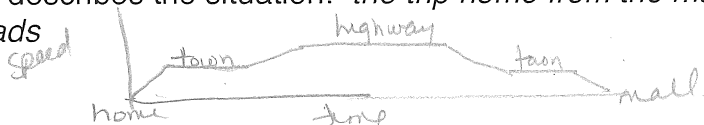
94. $g(3)$

$$g(3) = 3^2 + 2(3) - 6 = 9$$

95. $h(9)$

$$h(9) = \sqrt{9+5} = \sqrt{14}$$

96. Draw and label a graph that describes the situation: the trip home from the mall on the highway and on town roads



97. Identify the independent and the dependent variable: The cost of the limousine on prom night depends upon the number of people in the limousine.

independent = # people dependent = cost

Erin's mom is running her a bath. The number of gallons (g) in the bath tub can be represented by the equation $g(t) = \frac{5}{2}t$, where t is the time in minutes. The bathtub can hold 15 gallons of water.

98. How many gallons are in the tub after 3 minutes? $g(3) = \frac{5}{2}(3) = \frac{15}{2}$ gallons

99. When is the bathtub full? $\left(\frac{2}{5}\right)15 = \frac{5}{2}t \left(\frac{2}{5}\right) \quad t = 6 \text{ min}$

100. What is the slope of the function? What does it represent in relation to this problem?

$$\text{slope} = \frac{5}{2}$$

represents tub fills
at a RATE of
 $\frac{5 \text{ gal}}{2 \text{ min}}$